

female  
gypsy  
moth

# Alien Invader The Gypsy Moth

(Teachers please note: embedded in the text are important concepts indicated by (\*). Sharing these concepts during classroom discussions may prove helpful to your students.)

The gypsy moth (*Lymantria dispar*) is native to Europe, Asia and North Africa. In its native range gypsy moths can be found from the frigid Russian Steppes to the subtropical shores of the Mediterranean. And, in its native range, its natural enemies, such as parasites and diseases keep it in balance with its environment.

In the United States the gypsy moth caterpillar is a serious defoliator of shade, fruit, and forest trees. The gypsy moth was brought to North America by Professor L. Trouvelot in a misguided attempt to breed a hardy silkworm. Between 1868 and 1869 some gypsy moths escaped when a specimen jar fell from Trouvelot's open window. Later on, more moths and caterpillars escaped from small populations growing on shrubs in Trouvelot's garden when high winds loosened protective nettings. The professor notified townspeople of the accidents, but the gypsy moth was not yet recognized as a pest and the residents of Medford failed to recover or destroy the escaped insects. The insects soon were established in a vacant lot next to his home in Medford Massachusetts.

The insects gradually increased their numbers and their range. They had an

easy time of it for the climate was favorable, the food supply abundant, and natural enemies were few. (\* *Important Concept*—Hungry gypsy moth caterpillars can eat the leaves of many trees and shrubs in North America. Although caterpillars prefer some species over others, there are a few trees they won't touch, even when starving. The caterpillar's favorite foods include: oaks, aspens, willows, apple and crabapple, tamarack, paper birch, witch hazel, mountain ash, basswood and linden. These trees are the first to be stripped of leaves when the gypsy moth population is increasing. Less frequently defoliated are trees that the gypsy moth caterpillar can feed on but doesn't prefer—maples, walnut, chestnut, hickories, cherry, pines, hemlock, spruces, elms, hackberry, yellow birch, beech, cottonwood, box elder and ironwood. The caterpillar avoids green, white and black ash, balsam fir, locusts, scotch pine, red cedar, tulip popular, catalpa, sycamore and dogwoods.)

Twenty-one years later (1889) the Medford area experienced a gypsy moth outbreak. The gypsy moth caterpillar had defoliated fruit and shade trees in a 360 square mile area around the city. Local accounts described Medford as "being inundated by big, hairy caterpillars, so numerous that people slipped on masses of them clustered on the ground, streets and sidewalks" and as "they gobbled away

in the trees, their excrement (frass), like a shower of coffee grounds, drizzled to the ground below."

Twelve years later (1901) gypsy moths were found in Rhode Island. Four to five years later (1905-1906) they were found in New Hampshire and Connecticut. Seven years later (1912) they had spread to Vermont and ten years later (1922) the first major invasion of gypsy moth was recorded in New York. By 1927, the gypsy moth caterpillar defoliation in infested states topped 100,000 acres.

In 1932, serious infestations were reported near Scranton, Pennsylvania. Twenty-one years later (1953) Gypsy moth defoliation in infested areas topped 1 million acres. (\* *Important Concept*: While gypsy moth caterpillars sometimes defoliate trees across hundreds of thousands of acres, we need to remember that the insect is present and not causing noticeable defoliation in an area many times as large. In a very general way, defoliation tends to be highest where egg mass density represents an increasing population and where the tree species are preferred food for the insect.)

In 1954, the gypsy moth was discovered in Michigan's lower peninsula. Throughout the 1960s and 1970s gypsy moth populations rose and fell in various infested areas.

(\* *Important Concept*: The gypsy moth goes through dramatic changes in abun-

## Early Larval Defoliation



## Mid-Larval Defoliation



## Late Larval Defoliation



dance. Most of the time, gypsy moth populations are relatively low and you rarely see a caterpillar unless you look for one. Typically, the population will continue to grow until there are so many caterpillars that they consume all the available food. It's at this "outbreak" stage in their population cycle that we have problems with the gypsy moth. It is often only one to three years before starvation, disease and natural enemies cause the population to crash back to low levels, but in the meantime a lot of damage is done to trees.)

In 1980, defoliation topped 5 million acres in heavily infested areas. By 1981 visible defoliation occurred on 12.9 million acres from Maine to Maryland. (\* Important Concept: Foliage-eating insects are always present in the forest and all trees are likely to lose some of their foliage to insects every year. Surprisingly defoliation alone rarely kills a tree. Repeated heavy defoliation, however, may result in higher tree mortality. Yard and street trees, often under more stress, may succumb as a result of even one defoliation.)

In 1986, over 64,000 acres were defoliated in Michigan and the insect was detected in all the counties in the Lower Peninsula and five counties in the Upper Peninsula. By the 1990s, gypsy moths inhabited eastern Wisconsin. In 1992, serious defoliation occurred across nearly 750,000 acres in Michigan. The gypsy moth currently inhabits eastern Wisconsin. Wisconsin recorded its first visible defoliation in 1997. A two-acre patch of shrubby willow in Oconto County was completely defoliated. (\* Important Concept: The most obvious effect of a gypsy moth "outbreak" is the defoliation of trees. This typically occurs in mid-June. All leaves on favored species, like oak, can be eaten within a week. Most trees will put out a replacement set of leaves, i.e. re-foliate, by late July, and the forest will be green again. Re-leafing, however, is very stressful for a tree and can lead to mortality of buds, twigs and/or branches. Tree growth will be slowed for several

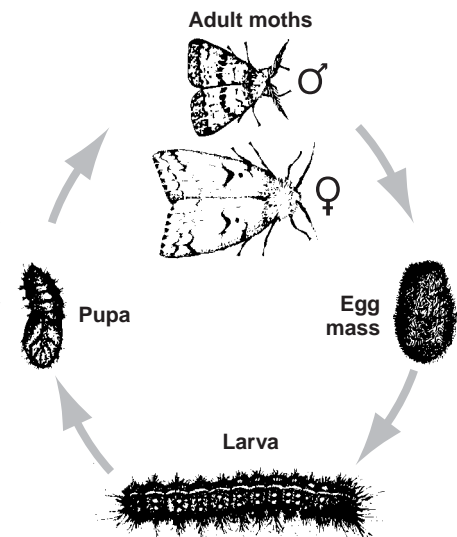
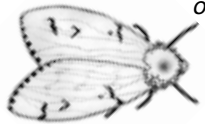
years following defoliation, and a slow growing tree is more vulnerable to attack by other forest insects and diseases. Trees weakened by defoliation will also stop producing nuts, sometimes for several years, affecting species that depend on them for food. During the weeks that trees are bare, predators can easily find nests, and songbirds may have difficulty raising young. Reduced shade can result in increased water temperature, which lowers the amount of oxygen in the water. In addition, a dense canopy of leaves buffers the violence of summer storms and when that protection is removed, substantial runoff can result, further degrading water quality in streams. While this condition only persists until trees re-leaf, fish and other aquatic animals can be stressed during this period.)

Gypsy moths currently inhabit eastern Wisconsin in counties bordered by Lake Michigan from Kenosha through Door County, up to Oconto and Marinette counties. The westward expansion of the moth's range in Wisconsin has been rapid in populated areas where oaks are the dominant trees—between Milwaukee and Madison and in Waushara, Waupaca, and Portage counties. Although the gypsy moth will continue to spread, our tree and forest resource will survive. Gypsy moth outbreak can be delayed or reduced to a level where the stress on trees and people is tolerable. (\* Important Concept: The most common treatment used against gypsy moth is a spray of *Bacillus thuringiensis*, commonly called Bt. This bacterial insecticide kills caterpillars that eat it within a week of its application. Bt causes the cells of the caterpillar's stomach lining to rupture. Bt is found naturally in soil and degrades within a week when exposed to sunlight. The variety of Bt used against the gypsy moth caterpillar affects caterpillars of the order Lepidoptera. Bt has no effect on people, animals, birds or fish. Sprays have no effect on gypsy moth caterpillars outside the treated area. Local suppression programs may be done for one to three years when the gypsy moth population is in the outbreak stage. Once the gypsy moth cater-

pillar population has collapsed in the region, no sprays will be needed for several years.)

The rapid migration west of the gypsy moth in the United States can be linked to people unknowingly moving egg masses attached to vehicles, firewood, nursery stock and outdoor furniture. One infestation in Virginia began when an unsuspecting landowner moved several dog houses from New Jersey that contained gypsy moth egg masses. Wind, although it can disperse male moths and young caterpillars, does not account for the rapid spread of the moth. Regulations requiring the inspection of logs, nursery plants, Christmas trees and outdoor household items, help reduce the number of accidental introductions, but doesn't stop them all.

What can be done to slow the spread of the gypsy moth? The Wisconsin Department of Agriculture, Trade and Consumer Protection recommends that you: 1) check your vehicles and equipment for egg masses before you leave on vacation and again before you return home, so you don't let the gypsy moth hitch a ride with you; 2) examine your patio furniture, trees and sheltered spots on buildings for egg masses in the fall; 3) grant permission to state and federal trappers to place and monitor gypsy moth traps on your property and 4) notify the Wisconsin Department of Agriculture, Trade and Consumer Protection, if you find gypsy moth in any life stage. Call 1-800-642-MOTH. To learn more about the gypsy moth in Wisconsin contact the Wisconsin Department of Agriculture and Consumer Protection, UW Extension or the Wisconsin Department of Natural Resources—Forestry Program. ❖



# Activity: Alien Invasion

## Grades

6-12

## Subjects

biology, geography, science, vocational agriculture

## Objective

Students will be able to understand and map the history of the spread of gypsy moth populations.

## Materials

Maps of the world, the United States and Wisconsin; markers, plastic overlay, a copy of the Student Page—At a Glance—The Gypsy Moth Time Line In North America (on page 4) and a copy of the WDNR *Gypsy Moth Poster*—PUB-FR-138. Copies of the following WDNR publications may also be helpful, PUB-FR-053- *Forest Trees of Wisconsin (brochure)*, PUB-FR-101—*Forest Trees Of Wisconsin (poster)* and the USDA-Forest Services's PUB-FS-466—*Important Forest Trees of the Eastern United States*. WDNR Pub-FR-123—*Gypsy Moth Silvicultural Guidelines For Wisconsin* is recommended for advanced study. See "Resources" section for addresses.

## Procedure

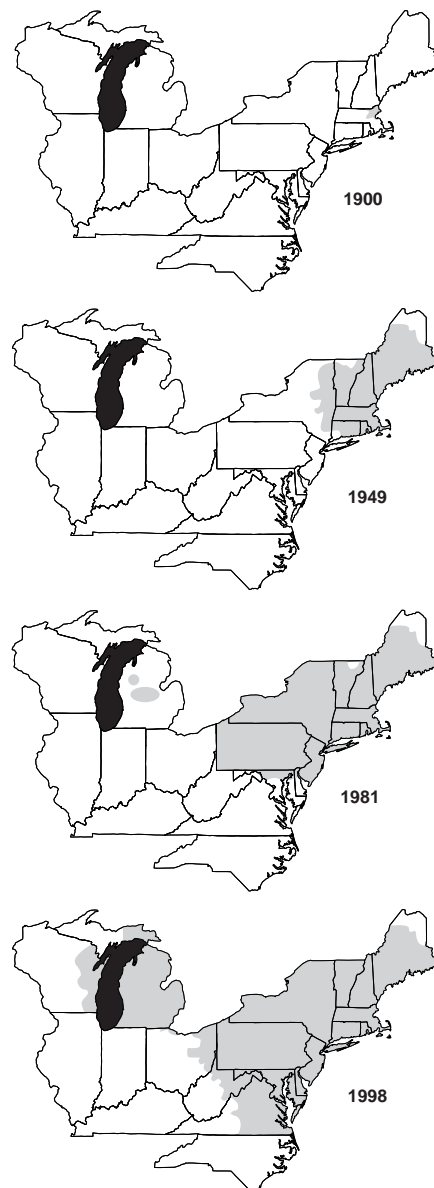
Divide the class into teams of 3-5 students each. Give each team a map of the world, the United States, and Wisconsin. Using the introductory material in this activity, discuss gypsy moth origin, introduction and spread. Have students indicate the gypsy moth's native range and

its spread in the United States and Wisconsin on plastic overlays.

## Enrichment:

1. Have students discuss individual actions that can slow the spread of the gypsy moth or lessen the impacts of an "outbreak." Advanced learners might be interested in linking susceptible Wisconsin forest cover-type to potential gypsy moth problems via the internet. The WDNR has a Web site page entitled Geographic Services. Listed under DNR Geographic data you will find listed WISCLAND Land Cover. This data set contains information on land cover for our state. It can be downloaded but requires ARCVIEW program software to view it. Some of the data on this Web site may require the use of Spatial Analyst in addition to ARCVIEW. The address for this page is <http://www.dnr.state.wi.us/org/et/geo/>.
2. Have students research other "alien invaders" and report on their status in Wisconsin. (Some suggestions: zebra mussel, purple loosestrife, sea lamprey, garlic mustard.) Students can visit *EEK!—Environmental Education for Kids*, <http://www.dnr.state.wi.us/eeek/> to find information on some of Wisconsin's alien invaders. Go to the "Our Earth" section.

When you're finished with this activity, students can go on to the next activity to learn more about the life cycle of the gypsy moth. ♦



# Activity: The Life of a Gypsy Moth

## Grades

6-12

## Subjects

science, vocational agriculture

## Objectives

Students will be able to identify the gypsy moth, understand its life cycle and habitat needs.

## Material

student worksheet (on page 5), gypsy moth poster (included in this activity guide)

## Background

If you take a walk in a forest heavily infested with gypsy moths, you may hear the gypsy moth caterpillars munching away on a variety of trees, shrubs and vines. Well, actually what you'll hear is not munching caterpillars, but caterpillar droppings falling through the vegetation.

The gypsy moth, introduced to the East Coast in 1868, has now arrived in Wisconsin. This insect can be very destructive to our forests and landscape trees. Wisconsin is now battling this invader. The following activity will help your students learn more about the moth and its life cycle and when and how it causes

damage. Your students can then get involved in monitoring and control efforts.

## Procedure

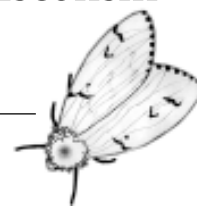
Make copies of the student worksheet. Have students read the information about gypsy moths and then have them work in small groups to answer the worksheet questions. They may also want to refer to the gypsy moth poster. ♦



## Student Page

# Alien Invasion

*The gypsy moth (caterpillar) is a serious defoliator of trees and shrubs in North America. Use the following time line and additional information provided by your teacher to trace how this happened and map the spread of the gypsy moth population in North America.*



## At A Glance—The Gypsy Moth (*Lymantria dispar*) Time Line In North America

<b>1869</b>	The gypsy moth was introduced to North America by Professor L. Trouvelot in a misguided attempt to breed a hardy silkworm. Some insects escaped and were soon established in a vacant lot next to his home in Medford, Massachusetts.
<b>1889</b>	First recorded defoliation by gypsy moth caterpillars—fruit and shade trees in a 360 square mile area around Medford, Massachusetts.
<b>1890–1900</b>	In spite of control efforts the gypsy moth spreads through many parts of Massachusetts.
<b>1901</b>	Gypsy moth infestations found in Rhode Island.
<b>1905–1906</b>	Gypsy moth infestations found in New Hampshire and Connecticut.
<b>1912</b>	Gypsy moth population spreads to Vermont.
<b>1920</b>	Gypsy moth was again introduced into the United States. It came to New Jersey on blue spruce trees imported from the Netherlands.
<b>1922</b>	First major invasion of gypsy moth recorded in New York.
<b>1927</b>	Gypsy moth caterpillar defoliation in infested states tops 100,000 acres.
<b>1932</b>	Serious infestations reported near Scranton, Pennsylvania.
<b>1938</b>	An east coast hurricane spreads gypsy moth beyond previously infested areas.
<b>1940</b>	Extensive gypsy moth control efforts underway by various government agencies including the Federal War Department!
<b>1948</b>	Gypsy moth was thought to be eradicated in Pennsylvania.
<b>1953</b>	Gypsy moth populations swell in infested areas and defoliation tops 1 million acres.
<b>1954</b>	Gypsy moth discovered in Michigan 's lower peninsula.
<b>1960–70</b>	Gypsy moth populations rise and fall in various infested areas, but the spread of the moth continues slowly.
<b>1979</b>	Noticeable damage from gypsy moth is recorded in Maryland and Delaware.
<b>1980</b>	Gypsy moth caterpillar defoliation tops 5 million acres in heavily infested areas.
<b>1981</b>	Visible defoliation occurs on 12.9 million acres from Maine to Maryland. Small isolated populations resulting from spread of the pest have been found in localized areas of California, Illinois, Michigan, Nebraska, North Carolina, Ohio, Oregon, Virginia, Washington, West Virginia, Wisconsin and in Canadian provinces bordering New York and Vermont.
<b>1986</b>	Over 64,000 acres are defoliated in Michigan; the gypsy moth is detected in all counties in the Lower Peninsula and in five counties in the Upper Peninsula.
<b>1990s</b>	Gypsy moth inhabits eastern Wisconsin.
<b>1991</b>	Gypsy moth inhabits all the New England and Atlantic States south to northern Virginia and states west into eastern Ohio and Michigan.
<b>1992</b>	Serious defoliation occurs across nearly 750,000 acres in Michigan
<b>1997</b>	Wisconsin records its first defoliation—a two-acre patch of shrubby willow in Oconto County. In Wisconsin gypsy moth inhabits counties bordered by lake Michigan from Kenosha through Door County and up to Oconto and Marinette counties.
<b>1998</b>	Westward expansion of gypsy moth range in Wisconsin continues. Gypsy moth spread has been rapid in populated areas where oaks are the dominant trees between Milwaukee and Madison and in Waushara, Waupaca, and Portage Counties ♦



## Student Worksheet

# The Life Cycle of the Gypsy Moth

The gypsy moth has four distinct stages: egg, larva, pupa, and adult.



**egg mass**—The female gypsy moth lays between 500 to 1,000 eggs in August. They are laid all at once in a mass that is covered with velvety, buff-colored hair from the female moth's body. The larva starts developing during the remaining warm days of summer. As winter approaches, the tiny larva goes into diapause—it shuts down and passes the winter in suspended animation until spring. The eggs hatch in mid-May, just in time to start chewing on new leaves.



**larva**—(Also known as caterpillar) is the worm-like form of an insect. The larva is covered in long, stiff hairs. When it is very young, it's black. As the larva grows, pairs of colored warts appear running down the center of its back. The warts are red on the rear half and blue near the head.

Before the larvae settle down to feed, they will disperse through the forest by "ballooning." The larva will climb to the top of the tree, spin a thread and dangle

from it. When a breeze catches the larva, away it goes, usually landing within 150 yards of where it started. On occasion, the larvae are blown long distances. This is one way the gypsy moth travels to new areas.

In order to grow, the larva must shed its skin. Gypsy moth caterpillars will shed their skin 4-5 times, about once a week. It is the larval stage of the moth that causes all the damage to trees as the caterpillars feed on leaves. By July, the larvae have reached maturity.

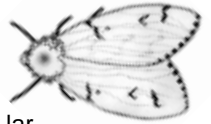
**pupa**—This is the metamorphic stage. Within the pupal shell, the caterpillar's body is rearranging itself into an adult moth. The outer skin is reddish-brown and may be attached by several silk threads to a tree trunk, rock, or board, hiding itself from predators and parasites.



**moth**—Adult stage of the insect. The male gypsy moth is about 1 inch long and has brown wings with black, wavy markings. The antennae are large and shaped like a feather. The female is larger, about 1½ inches long. Her wings are white with black markings. Her body is covered in

brownish-yellow "fur" and her antennae are thin. She has wings, but can't fly! From late July to early August, the gypsy moth will mate and the female will lay eggs. The adults die after mating.

When the gypsy moth population explodes, the feeding larvae can strip trees of leaves. This is called defoliation. Defoliation is very stressful for trees and can leave them so weak that they can be killed by other pests which would not normally bother them. The hungry larvae feed on many types of trees, but they do have their favorites. These are the ones defoliated most frequently.



## Favorite Gypsy Moth Food

alder	apple	aspen
birch	basswood	hawthorn
white birch	tamarack	oak
witch hazel		



There are some trees that the larvae avoid, even if they're starving. These are green, white and black ash; red cedar; scotch pine, and dogwood. ❖

## Can you answer these questions?

At what stage in its life cycle does the gypsy moth cause destruction?

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Which types of trees does the gypsy moth prefer?

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Does the gypsy moth caterpillar feed on street trees or just forest trees?

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What do you think has helped the moth spread across the United States?

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Why do you think people consider the gypsy moth a problem?

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## Activity

# What do you know? What can you do?



## Grades

6-12

## Subjects

science, social studies, vocational agriculture, language arts

## Objectives

Students will: a) research public knowledge/concern about gypsy moths by creating and delivering a survey about gypsy moths b) develop and implement a plan for informing the public about the gypsy moth.

## Material

art supplies

## Background

The gypsy moth has arrived in Wisconsin. Learning to manage the damage the gypsy moths does is critical to maintaining a healthy stand of trees in Wisconsin for wildlife, industry, and tourism. Information is one of the tools used in slowing the spread and managing the damage of the gypsy moth. Your students can help provide



information and management tips to people in your community.

## Procedure

This activity should follow activities #1 and #2. Now that your students know more about gypsy moths, they can help educate others in your community. Have your students develop a simple survey to determine what people already know about gypsy moths. Your survey can be formal or informal; delivered by mail, by phone, or in person. Survey questions might include:

- ✓ Have you ever heard of the gypsy moth?
- ✓ Are there gypsy moths in Wisconsin?
- ✓ Do you know what a gypsy moth caterpillar looks like?
- ✓ What does the gypsy moth caterpillar eat?
- ✓ Where would you look for gypsy moth caterpillars?
- ✓ Can you name one method for managing the gypsy moth?

Based on the answers to your surveys, have students determine what action they can take to help people learn more about gypsy moths. Do people need to see a picture of the gypsy moth and caterpillar? Do they need tips on how to inspect their property? Do they need information about the destruction the gypsy moth can cause? Do they understand the methods that are used to manage the gypsy moth?

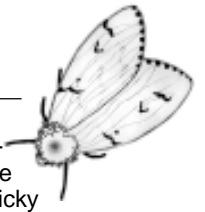
After determining what people need to know, have students brainstorm ways to get this information to the public. Maybe they can design a display to be set up at their school, local library or other public buildings. Perhaps they'd like to design and distribute brochures. Maybe they can develop a public service announcement or write an article for the newspaper.

As part of both student learning and community outreach, have your students gather resources about gypsy moths. You'll find a list at the end of this activity guide. ♦

—adapted from an activity by Al Brooks developed at the 1998 Wisconsin Association of Vocational Agriculture Teachers curriculum writing workshop.



# Glossary



**Bt**—*Bacillus thuringiensis*, a common soil bacterium that produces a toxin deadly to gypsy moth caterpillars. While not 100 percent specific to gypsy moth, Bt is the most selective pesticide commonly used against the gypsy moth. Bt has no effect on humans, pets, farm animals or plants.

**Caterpillar**—The larva (immature form) of moths and butterflies.

**Diapause**—A period during which growth or development is suspended.

**Defoliate**—Removal of leaves from plants.

**Defoliator**—Something that removes leaves from plants. Gypsy moth is a defoliator of trees.

**Egg Mass**—A cluster of eggs. A gypsy moth egg mass consists of eggs and body hair from the female moth. The buff-colored egg masses are typically 1 to 1 1/2 inches in length and are shaped like a teardrop. Each egg masses can contain 50 to 1,000 eggs.

**Eradication**—Elimination of an organism from an area. While it is possible to eradicate colonies of gypsy moth when they are very small and isolated, it is impossible to eradicate gypsy moth from North America.

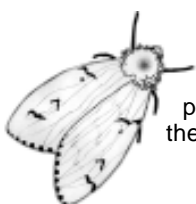
**Frass**- Insect droppings (excrement).

**Infestation**—A concentration of large numbers of a pest.

**Instar**—The stage between larval molts. Gypsy moth males typically go through five instars before pupating, females go through six.

**Larva**—The immature stage of an insect with complete metamorphosis. Among moths and butterflies the larva is commonly called a caterpillar.

**Life cycle**—Progression through the stages of life. The gypsy moth life cycle is: egg → larva (caterpillar) → pupa → adult (moth). The adult produces the egg and starts the cycle again.



**Molt**—In insects, a molt is shedding of the complete skin. The skin of an insect is its external skeleton and it doesn't allow for much growth. To get bigger, an insect must shed its old skin. As the gypsy moth caterpillar grows, it will molt four to six times.

**NPV**—Nucleopolyhedrovirus. NPV is a virus that kills only gypsy moths. Gypsy moth caterpillars weakened by starvation after defoliating their host trees become infected and die of NPV. An epidemic of this disease is what usually causes the end of an outbreak.

**Outbreak**—A dramatic increase in a population to very high densities. With gypsy moth, an outbreak is associated with complete defoliation of all host trees in the area. Population densities of one half million to six million caterpillars per acre are common during an outbreak. Gypsy moth outbreaks last from one to three years before starvation and disease cause the population to collapse. It will then be several years before the population has recovered to make another outbreak possible. In the New England states, outbreaks have occurred about every ten years since the 1960s.

**Pheromone**—The chemical "perfume" that female gypsy moths give off to attract male moths.

**Pheromone trap**—An insect trap that uses as its bait, the pheromone specific to the species you want to trap. Pest managers use pheromone traps baited with the gypsy moth pheromone to track the spread of gypsy moth populations. Gypsy moth traps can be shaped like six inch long tents or like half gallon milk cartons. They are usually orange but may be green or brown. Traps are set outdoors in the summer and picked up in the fall after all gypsy moth adults have died. By knowing the number of moths each trap caught and where the trap was located, pest managers can make a map of where gypsy moth colonies are becoming established. Don't disturb

traps. The tent-shaped traps are lined inside with a sticky material to catch male moths that enter and it is very difficult to get off your hands or clothes. The bigger "milk carton" traps have an insecticide strip inside that you must not touch!

**Pathogen**—An organism, such as a bacterium or virus, that can cause a disease.

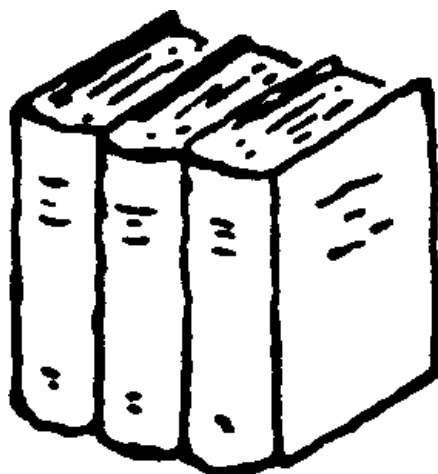
**Pupa**—The metamorphic stage of an insect life cycle where the body of the larva is transformed into that of the adult.

**Population monitoring**—The act of keeping track of the presence, the population density and the rate of spread of a species. Pest managers use pheromone traps to monitor spread of the gypsy moth. Surveys of the number of egg masses in an area are used to predict outbreaks and the level of defoliation in the following summer.

**Refoliation**—A deciduous tree will re-leaf, i.e. produce a second set of foliage if two-thirds or more of the original leaves are lost. The new leaves are usually smaller. Refoliation is very stressful for a tree. The growth rate of a tree that has had to refoliate will be slower than normal for several years following defoliation and it may not produce fruit or nuts during this recovery period. Trees stressed by defoliation may also be unable to fight off attacks by bark boring insects or diseases.

**Stress**—The negative effect on plants caused by poor growing conditions or damage caused by insects, disease, poor soil, too much or too little water. Defoliation by gypsy moth is only one of the many causes of stress to trees in Wisconsin.

**Suppression**—The reduction of a pest species below the level where it can cause significant damage. Outbreak populations of gypsy moth are often reduced using pesticides to prevent defoliation of valuable trees. ♦



## Resources

### Gypsy Moth Web Sites

**WI Dept. of Agriculture, Trade & Consumer Protection** [http://badger.state.wi.us/agencies/datcp/arm/plant\\_insect/plantind.htm#Gypsy Moth](http://badger.state.wi.us/agencies/datcp/arm/plant_insect/plantind.htm#Gypsy_Moth)

**United States Dept. of Agriculture (USDA)-Forest Service** [http://fhpr8.srs.fs.fed.us/programs/sts/sts\\_bref.htm](http://fhpr8.srs.fs.fed.us/programs/sts/sts_bref.htm)

**St. Paul, MN Field Office** [http://willow.ncfes.umn.edu/pa\\_gypsymoth/gypsymoth.htm](http://willow.ncfes.umn.edu/pa_gypsymoth/gypsymoth.htm)

**The Gypsy Moth Server at Virginia Polytechnic Institute and State University** <http://www.gypsymoth.ento.vt.edu/>

**Cooperative Ag. Pest Survey & NAPIS'-European Gypsy Moth** <http://www.ceris.purdue.edu/napis/pests/egm/>

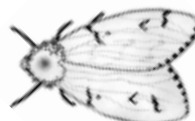
**Gypsy@Moth (info. about a listserver)** <http://gypsy.fsl.wvnet.edu/gmoth/subscribe.html>

### Gypsy Moth Publications and Audio-Visual Material

**Forest Management Strategies to Minimize Impact of Gypsy Moth, #83.** Priced at \$.50, include \$1.50 shipping and handling for each order. UW-Madison, Department of Forestry, 1630 Linden Dr., Madison, WI 53706, 608-262-9975.

**Gypsy Moth Silvicultural Guidelines for Wisconsin, PUB-FR-123,** no charge, single copies, provide name, address and telephone number when ordering. Wisconsin Department of Natural Resources, Bureau of Forestry, P.O. Box 7921, Madison, WI 53707-7921, 608-267-7494.

**Gypsy Moth Management Calendar for Homeowners, E-2591,** priced at \$.50. *Cloth Bands to Suppress the Gypsy Moth, E-2300,* no charge. *A Comparison of the Gypsy Moth and Forest Tent Caterpillar, E-2281,* no charge. MSU Bulletin Office, 10-B Agriculture Hall, Michigan State University, East Lansing, MI 48824-1039, 517-355-0240 (single copies), 516-353-6740 (bulk orders).



**Gypsy Moth: A Balanced Perspective** (video #14720, 18 min.), rental \$10. UW-Extension Offices, check your local phone book under county government listings.

**Gypsy Moth Poster, Pub-FR-131,** no charge for single copies. Send your name, address, and phone number when ordering. Send request to: Wisconsin DNR, Bureau of Forestry, P.O. Box 7921, Madison, WI 53707, 608-267-7494.

### Books for Children

**Gypsy Moth—Its History in America.** Robert M. McClung. 1974. Morrow Junior Books. While this book is somewhat dated, it does provide good background information on the gypsy moth. It also contains an appendix listing other insects often mistaken for the gypsy moth. ♦

